

WHAT IS CLAIMED IS:

1. A light scanning system formed on a common substrate comprising:

a light scanner, integrated on said substrate, for scanning light across a target; and

a sensor, integrated on said substrate, for detecting light reflected from said target and creating a signal representative of said detected light.

2. A light scanning system according to claim 1, wherein said light scanner includes:

a light source, integrated on said substrate, for producing a light beam; and

a deflector, integrated on said substrate, for deflecting said light beam across said target in a desired pattern.

3. A light scanning system according to claim 2, wherein said light scanner further includes:

a first lens for focusing the light beam produced by the light source.

4. A light scanning system according to claim 3, wherein said light source is aligned with an optical axis of said first lens.

5. A light scanning system according to claim 3, wherein said light source is offset from an optical axis of said first lens.

6. A light scanning system according to claim 3, wherein said light scanner further includes:

a second lens for focusing the light beam deflected by said deflector.

7. A light scanning system according to claim 6, wherein said first lens is a positive lens and said second lens is a negative lens.

8. A light scanning system according to claim 2, wherein said light scanner further includes:

a lens for focusing the light beam deflected by said deflector.

9. A light scanning system according to claim 2, wherein said deflector comprises a micro-machined scan module.

10. A light scanning system according to claim 9, wherein said micro-machined scan module comprises:

a scanning mirror mounted in a center of said sensor;  
hinges connected to said detector to allow said detector and said scanning mirror to rotate about a rotation axis; and  
a frame secured to said substrate for supporting said hinges.

11. A light scanning system according to claim 9, wherein said micro-machined scan module comprises:

an electrode;  
a support mounted on said electrode; and  
a mirror element mounted at one end on said support; and  
wherein a voltage applied between said electrode and mirror element bends said mirror element.

12. A light scanning system according to claim 9, wherein said micro-machined scan module comprises:

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a scanning mirror;  
hinges connected to said scanning mirror to allow said scanning mirror to rotate about a rotation axis; and  
a frame secured to said substrate for supporting said hinges.

13. A light scanning system according to claim 12, wherein said rotation axis is perpendicular to a path of said focused light beam from said light source.

14. A light scanning system according to claim 12, wherein said light source comprises a laser diode focusing module mounted on a first portion of said substrate.

15. A light scanning system according to claim 14, wherein said frame is secured on a second portion of said substrate, which is parallel to said first portion of said substrate.

16. A light scanning system according to claim 14, wherein said frame is secured on a second portion of said substrate, which is sloped with respect to said first portion of said substrate.

17. A light scanning system according to claim 14, wherein said frame is mounted on said first portion of said substrate.

18. A light scanning system according to claim 12, wherein said hinges include a shape memory alloy.

19. A light scanning system according to claim 18, wherein said shape memory alloy is titanium nickel.

20. A light scanning system according to claim 12, wherein said light scanner further includes:

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electrodes for generating an electrostatic force by applying a voltage between each of said electrodes and said scanning mirror.

21. A light scanning system according to claim 20, wherein said electrodes include substrate electrodes disposed under said scanning mirror.

22. A light scanning system according to claim 21, wherein said electrodes further include upper electrodes disposed above said scanning mirror.

23. A light scanning system according to claim 20, wherein said electrodes include upper electrodes disposed above said scanning mirror.

24. A light scanning system according to claim 1, wherein said light scanner includes: comprising an electrode for generating a light source for producing a light beam; and said rotatable hinge connected to said light source to allow said light source to rotate about a rotation axis.

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25. A micro-machined mirror for scanning a light beam from an incident path to a desired pattern in a barcode scanner mounted on a common substrate, comprising:

a reflector for reflecting a light beam;  
hinges connected to said reflector to allow said reflector to rotate about a rotation axis; and  
a frame secured to said substrate for supporting said hinges.

26. A micro-machined mirror according to claim 25, wherein said hinges includes a shape memory alloy.

27. A micro-machined mirror according to claim 26, wherein said shape memory alloy is nickel titanium.

28. A micro-machined mirror according to claim 25, further comprising an electrode for generating an electrostatic force to rotate the reflector around said rotation axis.

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29. A method of manufacturing a scanner on a common substrate comprising the steps of:

- (a) forming a light diode for producing a light beam;
- (b) mounting said light diode to said common substrate;
- (c) forming a light scanner for scanning the light beam in a desired pattern; and
- (c) mounting said light scanner to said common substrate.

30. A method of manufacturing a scanner on a common substrate comprising the steps of:

- (a) forming a light diode for producing a light beam on said common substrate; and
- (b) forming a light scanner for scanning the light beam in a desired pattern on said common substrate.

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